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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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DR. MARK FRIEDMAN LTD.
C/o Bill Polkinghorn
Discovery Dispatch
9003 Florin Way
Upper Marlboro, MD 20772

EXAMINER	
POLYZOS, FAYE S	

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,463	SECUNDO ET AL.	
	Examiner	Art Unit	
	Faye Polyzos	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *16-38 and 49-56* is/are allowed.

6)☒ Claim(s) *1,3,4,6,7,14,39,40,42 and 46* is/are rejected.

7)☒ Claim(s) *2,5,8-13,15,41,43-45 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/13/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not). Misnumbered claims 44-57 have been renumbered 43-56 respectively.

Double Patenting

2. Applicant is advised that should claim 40 be found allowable, claim 48 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1, 3-4, 39-40 are rejected under 35 U.S.C. 102(b) as being anticipated by *Bly et al (US 4,959,546).*

Regarding claim 1, Bly discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer and characterized by an index of refraction; an electrical mechanism for inducing a changed in the index of refraction, the index change correlated with a temperature of the (TSE); and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the (TSE) temperature (See Generally Fig. 1, col. 2, lines 1-31 and lines 34-43).

Regarding claim 3, Bly discloses an absorbing layer attached to the electro-optic layer, whereby radiation emitted by a remote body and absorbed in the absorbing layer determines the (TSE) temperature (See Generally Figs. 1-2c and col. 2, lines 14-25).

Regarding claim 4, Bly discloses the thermal detection system wherein the radiation is infrared radiation (See Generally Fig. 1 and col. 2, lines 34-38).

Regarding claim 39, Bly discloses a method of radiation sensing comprising the steps of: providing a temperature sensing element (TSE) that includes an electro-optic (EO) material layer and characterized by an index of refraction; exposing the (TSE) to radiation, thereby affecting the temperature of the (EO) material; electrically inducing a change in the index of refraction, the change correlated with the (TSE) temperature; and optically reading the refraction index change, thereby providing a reading of the (TSE) temperature (See Generally Fig. 1, col. 2, lines 1-31 and lines 34-43).

Regarding claim 40, Bly discloses the thermal detection system wherein the radiation is infrared radiation (See Generally Fig. 1 and col. 2, lines 34-38).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Bly et al (US 4,959,546)* as applied to claim 1 above, and further in view of *Hornbeck et al (US 5,021,663).*

Regarding claims 6-7, Bly discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer and characterized by an index of refraction (See Generally Fig. 1, col. 2, lines 1-31). Bly does not specifically disclose EO material is a ferroelectric material. Hornbeck discloses the EO material is a ferroelectric material in the paraelectric phase (col. 1, lines 42-50). Hornbeck teaches pyroelectric detectors use ferroelectric ceramic material at operating temperatures and preferred ferroelectric materials have a large change in spontaneous dielectric polarization at operating temperatures, and the heating of the ferroelectric is detected by sensing the induced voltage created by the generation of charge across a capacitor with the ferroelectric as insulator (col. 1, lines 42-50). Therefore, it would have been obvious to modify the apparatus suggest by Bly to include a ferroelectric electro-optic material layer, as disclose supra by Hornbeck, to allow for a more versatile apparatus.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Bly et al (US 4,959,546)* as applied to claim 1 above, and further in view of *Elliott et al (US 4,594,507)*.

Regarding claim 14, Bly discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer and characterized by an index of refraction; an electrical mechanism for inducing a changed in the index of refraction, the index change correlated with a temperature of the (TSE); and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the (TSE) temperature (See Generally Fig. 1, col. 2, lines 1-31 and lines 34-43). Bly does not disclose of a calibrating mechanism. Elliott discloses an optional calibrating mechanism connected to the series with the temperature sensing element and used for calibrating the light intensity (col. 3, lines 32-54). Elliott teaches it is advantageous to arrange the analyzer to work appropriately close to an extinction so the read-out light intensity can be increased without saturating the detector array (col. 3, lines 34-45). Therefore, it would have been obvious to modify the system disclosed by Bly to incorporate a calibration mechanism as disclosed supra by Elliott, to allow for a more versatile apparatus.

7. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Bly et al (US 4,959,546)* as applied to claim 39 above, and further in view of *Hornbeck et al (US 5,021,663)*.

Regarding claim 42, Bly discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer and

characterized by an index of refraction (See Generally Fig. 1, col. 2, lines 1-31). Bly does not specifically disclose EO material is a ferroelectric material. Hornbeck discloses the EO material is a ferroelectric material in the paraelectric phase (col. 1, lines 42-50). Hornbeck teaches pyroelectric detectors use ferroelectric ceramic material at operating temperatures and preferred ferroelectric materials have a large change in spontaneous dielectric polarization at operating temperatures, and the heating of the ferroelectric is detected by sensing the induced voltage created by the generation of charge across a capacitor with the ferroelectric as insulator (col. 1, lines 42-50). Therefore, it would have been obvious to modify the apparatus suggest by Bly to include a ferroelectric electro-optic material layer, as disclose supra by Hornbeck, to allow for a more versatile apparatus.

8. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Bly et al (US 4,959,546)* as applied to claim 39 above, and further in view of *Elliott et al (US 4,594,507).*

Regarding claim 46, Bly discloses a method of thermal imaging comprising the steps of providing a temperature sensing element (TSE) that includes an electro-optic material layer and characterized by an index of refraction; an electrical mechanism for inducing a changed in the index of refraction, the index change correlated with a temperature of the (TSE); and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the (TSE) temperature (See Generally Fig. 1, col. 2, lines 1-31 and lines 34-43). Bly does not disclose of a method of providing an optical calibrating mechanism. Elliott discloses calibrating the light intensity by positing

an optical calibrating mechanism in series with the temperature sensing (col. 3, lines 32-54). Elliott teaches it is advantageous to arrange the analyzer to work appropriately close to an extinction so the read-out light intensity can be increased without saturating the detector array (col. 3, lines 34-45). Therefore, it would have been obvious to modify the method disclosed by Bly to incorporate a method of calibrating the light intensity as disclosed supra by Elliott, to allow for a more versatile apparatus.

Allowable Subject Matter

9. Claims 2, 5, 8-13, 15, 41, 43-45 and 47 are objected to as being dependent upon a rejected based claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

Regarding dependent claim 2, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising an electro-optic layer wherein the optical reading mechanism, laser beam, is configured to propagate through the electro-optic layer in a direction along the length axis.

Regarding dependent claim 5, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising a temperature controller connected to the substrate for setting substrate temperature.

Regarding dependent claim 8, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising an optical reading mechanism

further including a cross polarizer configuration of two polarizers positioned on two sides of the (TSE) along the length axis to manipulate the laser beam for intensity change.

Regarding dependent claims 9-10, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising a parallel dummy immune to radiation induced temperature changes positioned in parallel with the (TSE) between the two polarizers.

Regarding dependent claim 11, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising a reading beam propagating through the TSE and a reference beam propagating through the parallel dummy to obtain a combination output light intensity measurement, correlated to the (TSE) temperature through index of refraction change.

Regarding dependent claims 12-13, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising a parallel dummy including an EO material different from (TSE) (EO) material.

Regarding dependent claim 15, the prior art, as stated supra, does not disclose or fairly suggest a thermal detection system comprising calibration mechanism selected from a group consisting of a phase compensator and a serial dummy.

Regarding dependent claim 41, the prior art, as stated supra, does not disclose or fairly suggest a method wherein the (EO) layer has a length axis, and wherein the step of optically reading includes propagating a laser beam through the (EO) layer in a direction along the length axis.

Regarding dependent claim 43, the prior art, as stated supra, does not disclose or fairly suggest a method wherein the step of optically reading further including positioning two cross polarizers on two sides of the (TSE) along the length axis to manipulate the laser beam for intensity reading.

Regarding dependent claim 44, the prior art, as stated supra, does not disclose or fairly suggest a method wherein a parallel dummy immune to radiation induced temperature changes positioned in parallel with the (TSE) between the two polarizers.

Regarding dependent claim 45, the prior art, as stated supra, does not disclose or fairly suggest a method wherein the step of optically reading further includes positioning a parallel dummy immune to radiation induced temperature changes in parallel with the (TSE) and wherein the reading mechanism includes a first beam propagating through the TSE and a second beam propagating through the parallel dummy to obtain a combination output light intensity measurement, correlated to the (TSE) temperature through index of refraction change.

Regarding dependent claim 47, the prior art, as stated supra, does not disclose or fairly suggest a method wherein a calibration mechanism is selected from a group consisting of a phase compensator and a serial dummy.

11. Claims 16-38 and 49-56 are allowed.

Regarding independent claim 16, the prior art does not disclose or fairly suggest a thermal detection system comprising an optical reading mechanism wherein a laser beam propagating along the length axis of the (EO).

The examiner notes that while it is known in the art for a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer and characterized by an index of refraction; an electrical mechanism for inducing a changed in the index of refraction, the index change correlated with a temperature of the (TSE); and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the (TSE) temperature (see for example Bly et al – US 4,959,546 – Fig. 1, col. 2, lines 1-31 and lines 34-43), the prior art does not fairly suggest the laser beam propagating through the length axis of the (EO) layer.

Regarding independent claim 29, the prior art does not disclose or fairly suggest a thermal detection system comprising a plurality of dummies, wherein the electrical mechanism is applied to a pair of the individual (TSE) where the optical reading mechanism applied simultaneously to the (TSE) and the dummy of the pair to provide a reading of a temperature difference between (TSE) and dummy.

The examiner notes that while it is known in the art of a method for thermal imaging comprising the steps of: providing differences between a scene temperature and an array temperature to transform into a signal by the value of a detector, whether receptive or captive (see for example *Meissner et al – US 5,559,332 A* – col. 5, lines 3-11), the prior art does not fairly suggest a method for thermal imaging wherein the (TSE) and the dummy are located in adjacent columns.

Regarding independent claim 49, the prior art does not disclose or fairly suggest a method for thermal imaging comprising the steps of: providing a dummy located adjacent columns to the (TSEs).

The examiner notes that while it is known in the art of a method for thermal imaging comprising the steps of: providing differences between a scene temperature and an array temperature to transform into a signal by the value of a detector, whether receptive or captive (see for example *Meissner et al – US 5,559,332 A* – col. 5, lines 3-11), the prior art does not fairly suggest a method for thermal imaging wherein the (TSE) and the dummy are located in adjacent columns.

The remaining claims are allowable based on their dependency.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP

DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800